

Extending Firefox to Become an Easy-to-use Tool to Access Grid Computing Systems

Open position for graduate student in the GCLab at the University of Delaware

Introduction

Grid computing systems provide scientists with powerful infrastructures for their computational simulations, data management, and visualization. As grid infrastructures mature, an increasing challenge is to provide scientists with intuitive interfaces to grid computing systems. So far, scientists have been challenged to access grid systems through unfriendly command-line clients: normally this implies using several different command-line clients first to get authentications needed for accessing the grid system and then to use its data and/or computing resources. This has often discouraged scientists from using grid infrastructures in their day-to-day research. On the other hand, the Mozilla's Firefox browser is a familiar tool for scientists. Despite familiar, the Firefox browser has been lacking of the capability to integrate grid protocols and APIs to access grid computing services. To leverage the capabilities of the Firefox browser to provide rich end-user tools that seamlessly integrate with remote grid services and data repositories, we have implemented a first prototype of a Firefox browser that allows scientists to perform data upload, download, and directory listing from a GridFTP server (a data repository based on the grid toolkit Globus). By using our extended Firefox browser, scientists can now perform these actions simply by providing the well-known browser with an URL including the file or directory name and the related GridFTP server rather than using command-line clients. The installation of Globus libraries on the local desktop of the scientist is no longer required (as it is, on the contrary, for command-line clients) because any needed library is already part of our extension. Any needed authentication is masked behind user-friendly menu items of the browser.

Proposed research

In order for scientists to take full advantage of existing grid systems, several additional advanced features need to be integrated into our extended Firefox browser. This project aims to integrate these new features in our Firefox extension: *third-party transfers*, *parallel data transfers*, and *partial file transfers*. *Third-party transfers* will allow scientists to connect to two GridFTP servers simultaneously and initiate a direct file transfer between GridFTP servers from the end-user desktop dragging a file from one browser window and dropping it in the other. The main challenge to implementing this feature is adding the ability for Firefox to connect to multiple GridFTP servers simultaneously. In order to accomplish this, multiple credentials must be saved in the users Firefox profile, and differentiated for each connection. This could be accomplished by associating each credential in the user's profile with the URL of the server being accessed. *Parallel data transfers* is related to third-party transfer and will allow multiple TCP streams to be used for data transfers between GridFTP server and desktop as well as between two GridFTP servers in order to improve aggregate bandwidth (transfer speed). Although it is possible to have multiple network interface cards on a desktop computer, this feature is more often used to transfer files between servers running a networked file system. Implementation of third-party transfers is a prerequisite for using this feature between two servers. *Partial file transfers* allow an arbitrary portion of a file to be specified for transfer. This feature will allow scientists on desktop and laptop computers to upload or download only portions of large files from a GridFTP server by specifying a starting and ending offset for the file transfer. This feature will require adding a method in our current Firefox extension for indicating a partial file transfer and specifying the starting and ending offsets. For partial file uploads, a new item could be added to the Firefox file menu. For partial file downloads, this could be accomplished by adding a new menu item to the popup menu when right clicking a file link.

Required skills

Very good C/C++ programming skill; knowledge in grid computing and GridFTP protocol

Contact

Please contact Michela Taufer at taufer AT udel.edu or by phone at 302 831 0071.

Collaborator

Karan Bhatia (San Diego Supercomputer Center)

Relevant publications

- K. Bhatia, M. Taufer, B. Stearn, R. Zamudio, D. Catarino: Integrate GridFTP into Firefox - Build grid protocols into Mozilla-based tools. IBM developerWorks, 10 Oct 2006.
- R. Zamudio, D. Catarino, M. Taufer, K. Bhatia, and B. Stearn: Topaz: Extending Firefox to Accommodate the GridFTP Protocol. In Proceedings of the Fourth High-Performance Grid Computing Workshop (HPGC'07), in conjunction with IPDPS'07 March 2007, Long Beach, California, USA.